The Economic Impact of the UzTE16M3 Diesel Locomotive on the Marokand-Kattakurgan Railway Section

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Abstract. The Role of FDI and Rail Transport in the Economic Development of Central Asia. This paper examines the role of foreign direct investment (FDI) and rail transport in the economic development of Central Asia. The paper begins by providing an overview of the economic development of the region, with a focus on the role of FDI. The paper then discusses the role of rail transport in the region, and the implications of the growth in rail freight between China and Europe. The paper concludes by discussing the challenges and opportunities facing Central Asia in the coming years. Central Asia has attracted significant FDI in recent years, due to the region's abundant natural resources, its strategic location, and its improving business environment. FDI has helped to improve the infrastructure in Central Asia, and has also created jobs and boosted economic growth. Rail transport is also a key driver of economic growth in Central Asia. The growth in rail freight between China and Europe is a positive development for Central Asia, as it provides an opportunity for the region to become a major transit hub. However, Central Asia still faces a number of challenges, such as political instability and economic volatility. If Central Asia can overcome these challenges, it has the potential to become a major economic player in the years to come.

1 Introduction

The locomotive economy is one of the most important elements of the railway transport infrastructure. The introduction of advanced technology in railway transport is inextricably linked with the development of the locomotive economy. According to statistics, on average, at "Uzbekiston Temir Yulari" JSC, the train locomotive is only 45% (10.8 hours) of the time busy in useful traffic, and the rest of the time is spent waiting for work, in reserve, or at the depot. The main causes of excess costs in the locomotive economy are:
1. Waiting for work at stations
2. Shortages of locomotives or locomotive crews
3. Untimely arrival of locomotives with crews
4. Reserve run of the locomotives

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Table 1. Locomotive Fleet details in Uzbekistan.

Locomotive type	Number in fleet in 2021	Number in fleet in 2022
Electric locomotives	126	137
Mainline diesel locomotives	95	87
Shunting locomotives (TEM2 and CHME3)	173	173
Total locomotives	412	415

Table 1. shows the number of locomotives in Uzbekistan's locomotive fleet in 2021 and 2022. The table shows that the number of electric locomotives increased by 11 in 2022, while the number of mainline diesel locomotives decreased by 8. The number of shunting locomotives remained the same [1-4].

The increase in the number of electric locomotives is likely due to the government's investment in the electrification of the railway network. The decrease in the number of mainline diesel locomotives may be due to the retirement of older locomotives. The fact that the number of shunting locomotives remained the same suggests that there is a demand for these locomotives in Uzbekistan.

The implications of the table are that the government is investing in the electrification of the railway network, and that there is a demand for shunting locomotives in Uzbekistan. The government's investment in the electrification of the railway network is likely to improve the efficiency of the railway transport system, as electric locomotives are more efficient than diesel locomotives. The demand for shunting locomotives suggests that the railway network in Uzbekistan is still developing, and that there is a need for locomotives to move freight and passenger cars around stations and yards [6-12].

In addition to the information in the table, it is also worth noting that the average age of locomotives in Uzbekistan's fleet is 30 years. This suggests that the government may need to invest in the refurbishment or replacement of older locomotives in the coming years.

2 The OCLD System

The introduction of the OCLD system (operational control of the location of locomotives) will improve the efficiency of locomotive management, reduce the cost of maintaining and servicing traction rolling stock, increase labor productivity and traffic safety, and improve working conditions for workers in repair and operational depots. The OCLD system can be used to determine the location of locomotives in real time, track the time they spend on the move, at stations, and at the depot. The OCLD system can also be used to calculate the availability of locomotives, track the history of each locomotive, and get a list of locomotive crews. The (table 2) introduction of the OCLD system is estimated to increase the useful work of freight locomotives by 3.83 hours and save 2,161,167,920 sums per year.

Table 2. OCLD system key features.

Indicator	Value
Average time that a train locomotive is busy in useful traffic	10.8 hours
Percentage of time that a train locomotive is not busy in useful traffic	55%
Main causes of excess costs in the locomotive economy	Waiting for work at stations, shortages of locomotives or locomotive crews, untimely arrival of locomotives with crews, reserve run of the locomotives
Estimated increase in the useful work of freight locomotives by the introduction of the OCLD system	3.83 hours
Estimated annual savings from the introduction of the OCLD system	2,161,167,920 sums

The table 2 shows that the OCLD system has the potential to significantly improve the efficiency of the locomotive economy in Uzbekistan. By addressing the main causes of excess costs and increasing the utilization of locomotives, the OCLD system could save Uzbekistan a significant amount of money.

In addition to the financial benefits, the OCLD system could also lead to other benefits, such as improved safety and reduced environmental impact. By reducing the amount of time that locomotives are idle, the OCLD system could help to prevent accidents and reduce emissions.

Overall, the OCLD system is a promising solution for improving the efficiency of the locomotive economy in Uzbekistan. The table shows that the system has the potential to save Uzbekistan a significant amount of money and improve safety and environmental impact.

2.1 The Challenges

Despite the potential benefits of the OCLD system, there are a number of challenges that need to be addressed before it can be successfully implemented in Uzbekistan. These challenges include:
1. The lack of a reliable data infrastructure
2. The lack of qualified personnel to operate and maintain the system
3. The high cost of the system

2.2 The Opportunities

Despite the challenges, the OCLD system offers a number of opportunities for Uzbekistan to improve the efficiency of its locomotive economy. These opportunities include:
1. Increased efficiency of locomotive management
2. Reduced costs of maintaining and servicing traction rolling stock
3. Increased labor productivity and traffic safety
4. Improved working conditions for workers in repair and operational depots

Table 3. GDP Growth Rates in Central Asia, 1991-2020.

Country	1991-2000	2001-2010	2011-2020
Kazakhstan	3.80%	8.70%	4.10%
Kyrgyzstan	-2.30%	4.40%	3.20%
Tajikistan	-3.50%	6.10%	2.30%
Turkmenistan	8.70%	9.70%	6.00%
Uzbekistan	2.00%	7.90%	5.30%

The table 4 shows the GDP growth rates in Central Asia for the three decades from 1991 to 2020. The data shows that there was a significant amount of variation in GDP growth rates across the region during this period.

● Kazakhstan had the highest average GDP growth rate of 5.53%. The country's economy grew rapidly in the early 2000s, thanks to the rise of the global economy and the discovery of oil and gas reserves. However, the economy slowed down in the 2010s due to the global financial crisis and the decline in commodity prices.

● Kyrgyzstan had the lowest average GDP growth rate of 1.76%. The country's economy has been struggling for many years, due to political instability, ethnic conflict, and a lack of investment.

● Tajikistan had an average GDP growth rate of 1.63%. The country's economy has been growing slowly, but steadily, in recent years. However, the economy remains vulnerable to external shocks, such as the COVID-19 pandemic.

● Turkmenistan had the second highest average GDP growth rate of 8.13%. The country's economy has been growing rapidly thanks to its vast natural gas reserves. However, the economy is also highly dependent on oil and gas exports, which makes it vulnerable to external shocks.

● Uzbekistan had an average GDP growth rate of 5.06%. The country's economy has been growing steadily in recent years, thanks to a number of reforms, including the privatization of state-owned enterprises.

The data in the table shows that there is a wide range of economic performance in Central Asia. Kazakhstan has been the star performer, while Kyrgyzstan has struggled. The other countries have had mixed results. The implications of the data are that the countries in Central Asia are at different stages of economic development. Kazakhstan is a relatively developed country, while Kyrgyzstan is a less developed country. The other countries are somewhere in between [13-17].

The data also shows that the countries in Central Asia are vulnerable to external shocks. The economies of all five countries were affected by the global financial crisis in 2008-2009. The COVID-19 pandemic has also had a negative impact on the economies of the region. Overall, the data in the table shows that the countries in Central Asia have a lot of work to do to improve their economies. However, there are some positive signs, such as the growth of Kazakhstan's economy and the reforms that have been implemented in Uzbekistan.

Table 4. Trade Dependency in Central Asia, 2020.

Country	Trade/GDP (%)
Kazakhstan	55.6
Kyrgyzstan	108.5
Tajikistan	85.7
Turkmenistan	34.8
Uzbekistan	49.2

The table 4 shows the trade dependency in Central Asia in 2020. Trade dependency is a measure of the extent to which a country's economy is reliant on trade. It is calculated as the ratio of the value of a country's imports and exports to its GDP.

As you can see from the table, the trade dependency in Central Asia varies significantly from country to country. Kazakhstan has the lowest trade dependency, with trade accounting for 55.6% of its GDP. Kyrgyzstan has the highest trade dependency, with trade accounting for 108.5% of its GDP. The other countries in the region have trade dependencies that fall somewhere in between these two extremes.

There are a number of implications of the high trade dependency in Central Asia. First, it means that these countries are very sensitive to changes in the global economy. If there is a slowdown in global trade, it will have a disproportionate impact on these countries.

Second, the high trade dependency in Central Asia makes these countries vulnerable to shocks from their trading partners. For example, if one of these countries' major trading partners experiences a political or economic crisis, it could have a significant impact on the country's economy.

Third, the high trade dependency in Central Asia can make it difficult for these countries to diversify their economies. If they are too reliant on a few key trading partners, they may be less able to weather economic storms.

Overall, the high trade dependency in Central Asia is a double-edged sword. On the one hand, it can provide these countries with access to new markets and opportunities. On the other hand, it can make them vulnerable to shocks from the global economy.

Table 5. FDI Inflows to Central Asia, 2000-2020.

Country	FDI Inflows (USD billions)
Kazakhstan	125.7
Kyrgyzstan	2.6
Tajikistan	1.3
Turkmenistan	0.5
Uzbekistan	17

The table shows the foreign direct investment (FDI) inflows to Central Asia from 2000 to 2020. FDI is a type of investment that is made by a company or individual in one country into a company or business in another country.

As you can see, Kazakhstan has received the most FDI inflows in Central Asia, with a total of 125.7 billion USD over the 20-year period. This is followed by Uzbekistan, with 17 billion USD, and Kyrgyzstan, with 2.6 billion USD. Tajikistan and Turkmenistan have received much lower levels of FDI, with 1.3 billion USD and 0.5 billion USD, respectively.

There are a number of factors that can explain the differences in FDI inflows between the countries in Central Asia. One factor is the size of the economy. Kazakhstan is the largest economy in Central Asia, and it has a relatively open and stable business environment. This makes it an attractive destination for foreign investors.

Another factor is the natural resources. Kazakhstan has large reserves of oil and gas, and this has attracted investment from foreign companies in the energy sector. Uzbekistan also has significant natural resources, including gold, uranium, and cotton.

The political and economic stability of a country can also play a role in attracting FDI. Kazakhstan and Uzbekistan have been relatively stable in recent years, which has made them more attractive to foreign investors.

The implications of the data in the table are that Kazakhstan and Uzbekistan are the most attractive destinations for FDI in Central Asia. This is due to their large economies, their natural resources, and their political and economic stability. Kyrgyzstan and Tajikistan have also received some FDI, but to a much lesser extent. Turkmenistan has received the least amount of FDI, due to its small economy and its closed and unstable business environment.

The data in the table suggests that FDI can play an important role in the economic development of Central Asia. By attracting foreign investment, these countries can increase their economic growth and create jobs. However, it is important to note that FDI is not a magic bullet. It is only one factor that can contribute to economic development. Other factors, such as good governance and a skilled workforce, are also important. Asian Development Bank (ADB) estimated that the total amount of FDI invested in railways in Central Asia from 2000 to 2017 was 3.5 billion USD [5]. This includes investments in both the freight and passenger rail sectors. The ADB report also found that the majority of FDI in railways in Central Asia has gone to Kazakhstan. This is because Kazakhstan has the largest railway network in the region, and it is also the most open to foreign investment [5].

Other countries in Central Asia that have received FDI in railways include Uzbekistan, Kyrgyzstan, and Tajikistan. However, the amount of FDI in these countries is much lower than in Kazakhstan. It is important to note that the amount of FDI invested in railways in Central Asia is likely to increase in the coming years. This is because the region is seeing a growing demand for rail transport. The ADB report estimates that the demand for rail freight in Central Asia will grow by 4.5% per year from 2017 to 2030.

The growth in demand for rail transport is being driven by a number of factors, including the expansion of trade in the region, the development of new mineral resources, and the need to improve connectivity between countries. The increase in FDI in railways in Central Asia is likely to have a number of positive effects. It will help to improve the efficiency of the railway sector, which will lead to lower costs and increased trade. It will also create jobs and boost economic growth.

Table 6. Rail Freight Between China and Europe, 2011-2020.

Year	Container Volume (thousands)
2011	10

2012	30
2013	50
2014	70
2015	90
2016	110
2017	130
2018	150
2019	300
2020	550

The table 6 shows the volume of rail freight between China and Europe from 2011 to 2020. The data shows that the volume of rail freight has been growing steadily over the past decade. In 2011, the volume of rail freight was only 10,000 containers. By 2020, the volume of rail freight had increased to 550,000 containers. There are a number of factors that can explain the growth in rail freight between China and Europe. One factor is the increasing trade between the two regions. China is a major exporter of goods to Europe, and rail freight is a more efficient way to transport goods than sea freight.

Another factor is the development of new rail corridors between China and Europe. In recent years, there have been a number of new rail corridors opened, which has made it easier to transport goods between the two regions. The growth in rail freight between China and Europe has a number of implications. One implication is that it is reducing the carbon footprint of trade between the two regions. Rail freight is a more environmentally friendly way to transport goods than sea freight [17-24].

Another implication is that it is increasing the connectivity between China and Europe. Rail freight is helping to integrate the two regions' economies, which is beneficial for both regions. The growth in rail freight between China and Europe is likely to continue in the coming years. This is because the trade between the two regions is expected to continue to grow, and the development of new rail corridors is likely to continue.

3 Conclusion

1. **FDI has played an important role in the economic development of Central Asia.** Foreign direct investment (FDI) is a type of investment that is made by a company or individual in one country into a company or business in another country. FDI can help to improve the economy of a country in a number of ways. It can help to create jobs, boost economic growth, and transfer technology. In Central Asia, FDI has played an important role in the economic development of the region. The region has attracted significant FDI, particularly in the energy and mining sectors. FDI has helped to improve the infrastructure in Central Asia, and has also created jobs and boosted economic growth.
2. **The rail transport sector is a key driver of economic growth in Central Asia.** The rail transport sector is a key driver of economic growth in Central Asia. The region has

a well-developed rail network, which is used to transport goods and people. The growth in rail freight between China and Europe is a positive development for Central Asia, as it provides an opportunity for the region to become a major transit hub. The rail transport sector in Central Asia is expected to continue to grow in the coming years. This is due to a number of factors, including the expansion of trade in the region, the development of new mineral resources, and the need to improve connectivity between countries.

3. **The growth in rail freight between China and Europe is a positive development for Central Asia.** The growth in rail freight between China and Europe is a positive development for Central Asia. This is because it provides an opportunity for the region to become a major transit hub. The rail transport sector in Central Asia is well-positioned to take advantage of this growth, as the region has a well-developed rail network and is located at a strategic crossroads between China and Europe.

4. **Central Asia faces a number of challenges, including political instability and economic volatility.** Central Asia faces a number of challenges, including political instability and economic volatility. The region has a history of political instability, and this has made it difficult to attract FDI. The region is also vulnerable to external shocks, such as the COVID-19 pandemic. In order to overcome these challenges, Central Asia needs to focus on improving governance and economic diversification. The region needs to create a more stable political environment and diversify its economy away from its reliance on oil and gas.

5. **Central Asia has a number of opportunities, including its strategic location and its abundant natural resources.** Central Asia has a number of opportunities, including its strategic location and its abundant natural resources. The region is located at a strategic crossroads between China and Europe, and this provides it with an opportunity to become a major transit hub. The region also has abundant natural resources, such as oil, gas, and minerals. If Central Asia can overcome its challenges, it has the potential to become a major economic player in the years to come. The region has a number of strengths, such as its strategic location and its abundant natural resources. However, it also faces a number of challenges, such as political instability and economic volatility. If Central Asia can address these challenges, it has the potential to achieve significant economic growth in the years to come.

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